THE DAMAGE AT MOBILE BY THE STORM.

The damage to buildings was probably more general than from any other storm, although only a few houses were demolished. Of the houses destroyed, the Lowenstein Building, valued at about $30,000, was the greatest individual loss. Numerous tin roofs were rolled up and other roofs totally or partly torn off, so that few interiors of houses escaped damage by rain.

Nearly all merchants in the wholesale business district elevated their wares above the level of the highest tide, which occurred in 1906, but the unprecedented high water wet the lowermost goods, and the grain in sacks was damaged to the fourth layer of sacks above the one submerged. All electric services were totally crippled, the telegraph lines going down at about noon July 5. The Western Union Telegraph Co. reestablished communication over one wire at about 11 p. m. July 7. Railroad traffic was suspended, and the heavy rains on July 7 again deterred the movement of trains. The wharves suffered greater damage than from any other storm, and shipping suffered considerably, although not so much as in the storm of 1906. The official list of the American vessels wrecked, kept in the office of the collector of customs, will not be completed for a month, as, owing to the disturbed conditions, returns are not being made by vessel owners. Through observation and inquiry of boatmen information was obtained for the following list of marine disasters: Two bay steamships are probably complete losses, and four others are sunk or aground; four tugs are sunk or aground; one Russian ship, one Russian bark, and the four-masted schooner *Elizabeth Doyle* are aground; 12 barges, mostly laden with coal, are sunk or aground; two river steamers are on top of the wharf; four large yachts and numerous small craft are sunk or aground.

The day preceding the storm being a holiday some of the tugs were without steam, and the prevalent opinion that a severe storm could not occur so early in the year resulted in many vessel masters not taking sufficient precautions.

The estimated damage to buildings, street paving, and electric services by wind and tide is $1,300,000; the damage to merchandise by tide is $500,000 and by rain $200,000; the damage to docks and railroads entering Mobile, $200,000; damage to vessels, $150,000; the loss of timber floated away, $75,000. Generally the parties that lost are not disposed to make known the extent of their losses, and more difficulty was experienced in securing information than following any storm since that of 1906. The estimates of the damage made by different parties differ by as much as $2,000,000 or $3,000,000.

At Mobile one death by drowning occurred, that of a colored woman blown from a house boat. Three other bodies of drowned persons were found near Mobile, but these may have come from the lower bay, as parts of a barge that was near Fort Morgan were found at Mobile.

VALUE OF THE WARNINGS.

The warnings issued were instrumental in saving lives and probably preventing some marine disasters. The protection of goods from high tides at Mobile probably prevented a loss of $100,000.

INFORMATION FROM STORM-WARNING SUBSTATIONS.

On the Mississippi coast the severity of the storm decreased rapidly west of Pascagoula. Based principally on reports from the storm-warning displaymen, the following is an account of the damage at the storm-warning substations:

Fort Morgan.—The storm was severe from early in the morning. Considerable damage was done to property. In lower Mobile Bay, near Fort Morgan, the barge *Harry Morse* and the schooner *Emma Lord* were sunk and the number of lives lost is probably 11. The barometer was 29.50 inches at midnight, July 4, and 28.38 at 4 p. m. July 5. (The instrument will be compared with the standard.)

Pascagoula.—Half of the buildings in the town were damaged. The monetary loss is estimated at $40,000, and an equal loss in the near-by town of Moss Point. The wind veered from northeast to southwest and there was a lull for about 20 minutes between 4 and 5 p. m.

Biloxi.—The property loss within the city limits by wind and water is estimated at $10,000. One person was killed. The wind backed from northeast to southwest. The tide was about 3 feet lower than during the storm of September, 1915.

Gulfport.—The estimated damage to property is $40,000.

Pass Christian.—The estimated damage to property is about $10,000; the tides were not high.

Bay St. Louis.—The damage by storm was slight, probably amounting to $200.

THE TROPICAL HURRICANE OF JULY 5, 1916, IN LOUISIANA.

By ISAAC M. CLINE, District Forecaster.

[Dated: Weather Bureau Office, New Orleans, La., Aug. 3, 1916.]

The western segment of an unusually severe tropical storm passed over southeastern Louisiana July 5, 1916. Advisory warnings giving the location and probable movement of the storm were received from the Central Office, July 2, 3, and 4, telegraphed to all coast stations, radiographed to ships at sea, telephoned to shipowners and agents, and published in the daily papers.

The following specific warnings were distributed to the public:

July 4. Hoist northeast storm warnings Louisiana coast, 8:15 p. m. Disturbance probably centered near middle Gulf, moving northwest. Caution is advised.

July 5. Advisory Louisiana and Texas coast stations, 9 a. m. Tropical storm nearing middle Gulf coast, moving northwest. Strong northerly winds and moderate gales on the Louisiana coast, with rising tide to-day and to-night. Moderate to fresh northerly winds on the Texas coast.

July 5. Change to hurricane warning, 11 a. m., Louisiana coast. *Notify people in exposed localities. High tides and hurricane winds* indicated this afternoon and to-night. Shipping should remain in port.

This warning was given an extraordinary distribution. It was telephoned to Fishers' Landing and Harvey's Canal, with instructions to send to Grand Isle by motor boat. Another motor boat was started out from Myrtle Grove with instructions to distribute warnings throughout the Barataria section and reach Grand Isle if possible. This boat carried the warning 18 miles, distributing it to fishing camps, and returned, covering a distance of 36 miles. It was sent to all telephone exchanges in south Louisiana at Government expense, and Superintendent Baird instructed all managers of telephone exchanges to which the warnings had been sent to give the warnings the widest possible distribution. Mr. W. A. Porteous, manager of the Western Union Telegraph Co., Mr. N. E. Church, manager of the Postal Telegraph Co., and Mr. Charles Marshall of the Louisville & Nashville Railroad, sent the warning to all managers and station agents without expense to the United States, with instructions to advise their patrons.

The warnings were heeded generally. Small craft put into safer harbors, large vessels stopped in the Mississippi at Pilottown or remained at New Orleans until advised

that it was safe to proceed. The Louisville & Nashville Railroad suspended trains early in the day and the New Orleans & Northeastern Railroad suspended all trains crossing Lake Pontchartrain early in the afternoon. As a precautionary measure, women and children working in the department stores and factories were, on the advice of the Weather Bureau, sent to their homes early in the afternoon.

The center of the storm moved inland somewhere near and east of Gulfport, Miss., and New Orleans, being on the rim of the hurricane, did not experience high winds. The maximum wind velocity at New Orleans during the hurricane was 35 miles per hour from the northwest, at 4:03 p. m. The wind direction was from the northeast from midnight until 8 a. m., north from 8 a. m., until 12 noon, northwest until 10 p. m., then west at 11 p. m., and southwest at midnight. Light misting rain fell most of the day. The barometer fell steadily but slowly from noon, July 4, the rate of fall increasing after midnight to about 0.15 inch an hour and continuing at that rate until 5:15 p. m. of the 5th, when the sea-level pressure was 29.41 inches, which is the lowest pressure recorded at New Orleans for any July.

At Burrwood the wind reached storm velocities about 1 a. m., July 5; verifying velocities occurred at frequent intervals during the early morning, and at 9 a. m. the wind increased to a gale, with maximum velocities during the hours ending at 9 a. m., 58; 10 a. m., 60; 11 a. m., 63; 12 noon, 62; 1 p. m., 60; 2 p. m., 58; 3 p. m., 56; 4 p. m., 49; 5 p. m., 46; and 6 p. m., 37. After 6 p. m. the wind gradually subsided. On account of trouble with the wireless apparatus at Burrwood we were unable to communicate with that station after 7 p. m., July 4. All persons at Burrwood, including the observer, went aboard the dredge *New Orleans* as a precautionary measure, and no barometer readings were taken at Burrwood between 2:30 a. m., July 5, and 2 p. m., July 5, when the barometer was rising again.

TABLE 1.—*Barometer readings at Burrwood, La.*

Date.	Time.	Barometer.	Wind direction.	Date.	Time.	Barometer.	Wind direction.
1916.	P. M.	*Inches.*		1916.	P. M.	*Inches.*	
July 4.....	12:45	29.77	ne.	July 4.....	8:30	29.65	n.
	1:15	29.78	ne.		9:30	29.63	n.
	1:45	29.77	ne.		11:30	29.59	n.
	2:15	29.74	ne.				
	2:45	29.72	ne.		A. M.		
	3:15	29.71	ne.	July 5.....	12:30	29.53	n.
	4:00	29.69	ne.		1:00	29.50	n.
	4:30	29.69	ne.		2:00	29.47	n.
	5:30	29.67	ne.		2:30	29.43	n.
	6:00	29.66	n.				
	6:30	29.65	n.		P. M.		
	7:00	29.65	n.		2:00	29.38	sw.

There was neither lightning nor thunder at Burrwood. The tide was 2.2 feet above the normal.

White Harbor.—The following report has been furnished this office by Prof. Flonan Schaffter from White Harbor (near Gulfport), Miss.:

On July 5 at 7 a. m. the tide was unusually high, the barometer was 29.55 inches, and the wind northeast; the barometer readings were as follows: 8 a. m., 29.46; 11 a. m., 29.40; noon, 29.32; 12:50 p. m., 29.22; 1:50 p. m., 29.13; 2 p. m., 29.10, and wind shifting to the north; 2:05 p. m., 29.02; 4:10 p. m., 28.88; 5 p. m., 28.85, the lowest barometer reading during the storm, and the wind shifting from north to northwest; 8:20 p. m., 29 inches; July 6, 12:45 a. m., 29.38, wind west to southwest; 7 a. m., 29.64.

Pass Christian, Miss.—Dr. A. R. Robertson, Pass Christian, Miss., has furnished the following record of observations made during the passage of the hurricane:

TABLE 2.—*Record of pressure and wind at Pass Christian, Miss., July 5, 1916.*

Date.	Time.	Barometer.	Wind direction.	Date.	Time.	Barometer.	Wind direction.
1916.	A. M.	*Inches.*		1916.	P. M.	*Inches.*	
July 5.....	8:00	29.65	ne.	July 5.....	3:30	29.12	n to nw.
	9:00	29.60	ne.		3:45	29.10	n to nw.
	10:30	29.52	n to ne.		4:00	29.08	nw.
	NOON.	29.42	n to ne.		4:15	29.06	nw.
					4:30	29.04	nw.
	P. M.				4:45	29.03	nw.
	12:15	29.40	n to ne.		5:00	29.03	nw.
	12:30	29.38	n to ne.		5:15	29.03	nw.
	12:45	29.38	n to ne.		5:30	29.04	w to nw.
	1:00	29.36	n.		5:45	29.03	nw.
	1:15	29.36	n.		6:00	29.04	w to nw.
	1:30	29.34	n.		6:15	29.04	w to nw.
	1:45	29.32	n.		6:30	29.05	w to nw.
	2:00	29.28	n.		7:00	29.10	(1)
	2:15	29.26	n.		8:30	29.16	(1)
	2:30	29.23	n.		9:00	29.20	(1)
	2:45	29.19	n.		10:00	29.28	(1)
	3:00	29.16	n to nw.		11:45	29.44	w.
	3:15	29.13	n to nw.				

[1] Wind backing to the west.

SOUTH CAROLINA HURRICANE OF JULY 13–14, 1916.

By J. H. SCOTT, Meteorologist.

[Dated Weather Bureau Office, Charleston, S. C., July 22, 1916.]

The hurricane that struck the South Carolina coast on July 13, 1916, and whose center passed inland during the early hours of the 14th was remarkable in a number of particulars. It was of unusual severity, though its path of destructiveness was comparatively narrow. Few, if any, of the usual premonitory signs were present. No unusual cloud formation or movement was observed locally in advance of the storm and even during the afternoon of the 13th, when fresh to strong gales were blowing, it was a subject of remark that the cloud movement appeared sluggish. The tides preceding the storm were only slightly above the predicted heights—a condition that invariably obtains during the prevalence of easterly winds, which had been blowing for a day or two. Variation of the tide from the predicted height at the customhouse dock, as obtained from United States Assistant Engineer Allen, was as follows: Low tide, about midnight 12th–13th, normal; high tide, morning of 13th, +0.8 foot; low tide, midday 13th, +1.3 feet; high tide, evening of 13th, +2.3 feet (actual height 8.5 feet, which was the highest during the hurricane); low tide, due $0^h\ 57^m$ a. m. of the 14th, +0.9 foot, occurred about 2 hours and 45 minutes after the predicted time because of westerly winds. High tide morning of the 14th was +0.5 foot.

The sky presented no unusual appearance at sunrise and sunset preceding or during the storm. The first indication of the advance of the hurricane was the abnormal pressure fall along the South Atlantic coast during the 12 hours ending at 8 a. m. of the 13th. Special observations were sent at 11 a. m., 2 p. m., and 4 p. m. on telegraphic orders, and another at 12:28 p. m. in accordance with existing instructions. Orders to hoist northeast storm warnings at 12:30 p. m. were received at 12:45 p. m. and orders to hoist hurricane warnings at 7 p. m. were received at that hour. Both received immediate attention. The hurricane warnings were distributed widely, though owing to a number of adverse circumstances it was not possible to carry out the prearranged plan in full.

Effort to communicate with McClellanville by telephone failed owing to the prostrated lines; and W. A.